4/4/2006

COLORADO WATER QUALITY CONTROL COMMISSION
STATE OF COLORADO

PREHEARING STATEMENT OF THE WATER QUALITY CONTROL DIVISION

REVISIONS TO THE CLASSIFICATIONS AND NUMERIC STANDARDS FOR THE SAN JUAN RIVER BASIN (REGULATION NO. 34).

I. STATEMENT OF FACTUAL AND LEGAL CLAIMS

The Water Quality Control Division ("Division"), serving as staff to the Water Quality Control Commission ("Commission"), is providing supplemental information concerning the proposals to modify certain sections of the Classification and Numeric Standards for the San Juan River Basins.

II. WRITTEN TESTIMONY

Separate exhibits are provided regarding a number of topics. A summary of the Division's position is set forth in the draft Statement of Basis, Specific Statutory Authority and Purpose contained in the hearing notice for the changes proposed by the Division (Notice Exhibit 1). The Division, in addition to the summary in the Statement, offers Division Exhibit 2, which contains the rationale for proposed changes to the standards on a segment-by-segment basis. Exhibit 2 was emailed to parties to this rulemaking. Hard copies are available upon request. Exhibit 3 are computer files on a compact disk of the data upon which Exhibit 2 is based. The compact disk is available from the Commission office, or a copy can be requested from the Division.

In addition, several items have emerged during the Division's focused attention on the details of Regulation 34. The following changes are in addition to those proposed in the notice.

A. Revised or Newly Proposed Temporary Modifications

The Division proposes to add the following temporary. Temporary modifications are proposed based on section 31.7(3)(a)(i) which states that the Commission may grant a temporary modification "where the standard is not being met because of human-caused conditions deemed correctable within a twenty (20) year period." Until sources are identified as natural or irreversible, they are treated as correctable. The proposed temporary modifications for total recoverable iron, as listed below, are proposed with an expiration date of 12/31/2011.

San Juan River 11a	Fe(ch)=1100 ug/l (trec) (new)
La Plata River 3a	Fe(ch)=1920 ug/l (trec) (new)
La Plata River 7a	Fe(ch)=1700 ug/l (trec) (new)
La Plata River 8a	Fe(ch)=1500 ug/l (trec) (revised)

Segment WBID: COSJDO03

Segment Number & Description: 3. Mainstem of the Dolores River from a point immediately above the confluence with Horse Creek to a point immediately above the confluence with Bear Creek.

Designation: None (Reviewable)

Classifications:
Aquatic Life Cold Water 1
~~Recreation 1a~~, Recreation E
Agriculture

Aquatic Life: Colorado Division of Wildlife (CDOW) records indicate the following fish species are present in the mainstem Dolores River: brown and rainbow trout; and mottled sculpin.

Water Quality Data – COSJDO03

Parameter	TVS ($CaCo_3$=174 mg/l)	WQCD 10716	DOW Data
pH s.u.	6.5-9.0	7.8-8.5 (14)	7.6-8.4 (70)
D.O. mg/l	6.0	7.4 (14)	--- (0)
Hardness*	NA	174 (14)	163 (70)
*E. coli***	126	4 (6)	--- (0)
Cd µg/l	0.6	0.5 (14)	1.1 (68)
Cu µg/l	14.4	0 (14)	5.5 (68)
Fe (dis) µg/l	NA	57 (14)	70 (68)
Fe (Trec) µg/l	1000	89 (14)	128 (68)
Pb µg/l	4.6	0 (14)	0 (68)
Mn µg/l	1983	213 (14)	154 (68)
Se µg/l	4.6	0 (14)	2.8 (68)
Zn µg/l	199	124 (14)	304 (68)
NH_3 mg/l	7.1	0.031 (14)	--- (0)
NO_3 mg/l	10	0.004 (14)	--- (0)

* Hardness measured as $CaCO_3$ mg/l
** *E. coli* measured as #/100 ml of water

Recreation: Existing primary contact recreational uses are documented. The book, Colorado Rivers & Creeks, Second Edition, describes kayaking on this segment. This segment flows through towns where it is likely that it may be used for recreation.

Water Supply: There are no currently identified community systems withdrawing surface water or groundwater under the influence of surface water from this segment.

Agriculture: Waters from this segment are used for livestock watering or crop irrigation.

Point Sources: Rico Development Corporation-St. Louis Tunnel (CO-0029793), a metals mining company, discharges to the Dolores River.

Water Quality: The table summarizes water quality data collected in the segment by WQCD from Dolores River below Rico (WQCD #10716) from 1/11/2001 through 8/8/2005. The TVS values are for a mean hardness of 174 mg/l from 14 data points.

Proposed Changes: Change Recreation Classification from Recreation 1a to Recreation E. Delete fecal coliform standard of 200/100 ml. Change the arsenic standard from As(ch)=50 ug/l (Trec) to As(ac)=340 ug/l and As(ch)=7.6 ug/l. Delete NH_3(ch)=0.02, and add NH_3(ch)=TVS.

Rationale: Changes based on Basic Standards, Reg. 31 changes from July 2005 hearing.

water quality concentrations. These data were therefore excluded to avoid skewing the ambient water quality data evaluation.

The ambient water quality data for sampling location COSJDO09-0.1 were used in all scenarios.

Ambient Water Quality for Low Flow Zero Receiving Waters

The ambient water quality was not assessed for the receiving waters of the seeps and adits where the in-stream low flow condition is zero, because the corresponding in-stream low flow condition of zero would negate the impacts of the ambient water quality data.

III. Water Quantity

The Colorado Regulations specify the use of low flow conditions when establishing water quality based effluent limitations, specifically the acute and chronic low flows. The acute low flow, referred to as 1E3, represents the one-day low flow recurring in a three-year interval. The chronic low flow, 30E3, represents the 30-day average low flow recurring in a three-year interval.

Low Flow Analysis

To determine the low flows at the multiple locations evaluated in this WQA, a flow gage measurement immediately upstream of the discharge should be used. Because there were no flow gages immediately upstream of the discharges from the Rico-Argentine Mine area, a downstream gage station was used.

Daily flows from the USGS Gage Station 09165000 (Dolores River near Rico, CO) were obtained and the 1E3 and 30E3 low flows were calculated using U.S. Environmental Protection Agency (EPA) DFLOW software. The output from DFLOW provides calculated acute and chronic low flows for each month.

To estimate the low flows upstream of the discharges of concern, one major diversion and contributions by the discharges of concern prior to the gage station had to be evaluated.

According to discussions with the local Water Commissioner, there is one major diversion upstream of Gage Station 09165000. Specifically, the Town of Rico water supply diverts flow in Silver Creek at a point upstream of the Blaine Adit discharge point. The local Water Commissioner was not able to estimate the amount of the diversion and suggested contacting the Town of Rico. Discussions with Town of Rico representatives revealed that an estimated 50,000 gpd (0.077 cfs) are diverted from Silver Creek at a point above the Blaine Adit discharge point. Flow from Silver Creek is diverted continuously to the Town of Rico Water Supply. According to the local Water Commissioner, there are only two other diversions in this basin. These diversions supply water to single cabin claims and therefore were considered negligible for purposes of this evaluation.

To estimate the contributions by discharges of concern, the historical average discharges were determined. These included:

- Blaine Adit at 1.5 gpm (0.0033 cfs) based on the reported long-term average and a period of record from October 1999 through June 2000
- Argentine Seep at 51 gpm (0.11 cfs) based on the post-VCUP cleanup period from October 1996 through July 1997
- St. Louis Ponds System based on the monthly average flow determined from DMR data available for a period or record from January 1985 through December 1986 for the three seasons that were evaluated at the request of ARCO:
  - 1.4 cfs from January through March
  - 2.0 cfs from April through September
  - 1.5 cfs from October through December
- Columbia Tailings Seep at 0.034 MGD (0.053 cfs) which is the incremental Dolores River basin flow from the confluence of Silver Creek to a point upstream of the Silver Swan Adit
- Rico Boy Adit at 3.5 gpm (0.0078 cfs) based on a period of record from October 1995 through July 1997
- Santa Cruz Adit at 22 gpm (0.049 cfs) based on a period of record from October 1995 through July 1997
- Silver Swan Adit at 45 gpm (0.10 cfs) based on a period of record from October 1995 through July 1997.

The average diversion flow of 0.077 cfs was added and the seasonal average flows for the St. Louis Ponds and the annual average flows from the other discharge points were deducted to establish a flow record based on natural drainage. Additionally, during the months of March, April, May, June, and October, the acute low flow calculated by DFLOW exceeded the chronic low flow. In accordance with WQCD standard procedures, the acute low flow was thus set equal to the chronic low flow for these months. This synthesized flow record was then used to estimate low flows at multiple locations throughout the Dolores River basin.

Flow data from October 1, 1988 through September 30, 1996 and beginning again from October 1, 1998 through September 30, 2000 were available from the gage station. This gage station and time frames were deemed the most accurate and representative of current flows and were therefore used in this analysis.

To estimate the low flows at each discharge point, the ratio of the watershed area above the discharge point to the watershed area above the gage station was determined. The low flow calculated at the gage station was then multiplied by the ratio of watershed areas to determine the low flows available upstream of each discharge point.

Based on the low flow analysis described previously, the upstream low flows at multiple locations through the Dolores River Basin were calculated and are presented in Table A-14.

Currently, it is the WQCD's standard approach to assume that there is no available dilution in a wetlands area and in unnamed tributaries until such time as a mixing zone study has been completed to demonstrate the available dilution. Furthermore, comparable findings are expected in the side channel of the Dolores River upstream of the Columbia Tailings Seep. Thus, for purposes of this analysis, low flows for the wetlands areas, the side channel of the Dolores River and for the unnamed tributary to Silver Creek are summarized in Table A-15.

Table A-14

Low Flows for the Dolores River at Multiple Locations

Location	*Low Flow (cfs)*	*Annual*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
COSJDO03, Mile 0.4 (Dolores R. Above St Louis Ponds, Ambient)	1E3 Acute	2.9	3.1	3.0	4.1	10	28	29	17	12	15	6.9	2.9	2.9
	30E3 Chronic	3.9	3.9	3.9	4.1	10	28	29	18	18	15	6.9	3.9	3.9
COSJDO03, Mile 1.1 (Dolores R. Prior to St. Louis Ponds Discharge)	1E3 Acute	2.9	3.1	3.1	4.1	10	28	29	17	12	15	6.9	2.9	2.9
	30E3 Chronic	3.9	4.0	4.0	4.1	10	28	29	18	18	15	6.9	4.0	3.9
COSJDO09, Mile 0.1 (Silver Cr. Above Blaine Adit)	1E3 Acute	0.12	0.14	0.13	0.20	0.64	1.9	1.9	1.1	0.78	0.92	0.40	0.12	0.12
	30E3 Chronic	0.19	0.19	0.19	0.20	0.64	1.9	1.9	1.2	1.2	0.97	0.40	0.19	0.19
COSJDO09, Mile 0.4 (Silver Cr. Above Argentine Seep)	1E3 Acute	0.18	0.20	0.19	0.29	0.84	2.4	2.5	1.4	1.0	1.2	0.54	0.18	0.18
	30E3 Chronic	0.27	0.27	0.27	0.29	0.84	2.4	2.5	1.5	1.5	1.3	0.54	0.27	0.27
COSJDO03, Mile 2.0 (Dolores R. Above Rico Boy, Santa Cruz Adits)	1E3 Acute	4.8	5.0	4.9	6.1	14	34	35	21	16	18	9.4	4.8	4.8
	30E3 Chronic	5.9	5.9	5.9	6.1	14	34	35	22	22	19	9.4	6.0	5.9
COSJDO03, Mile 6.2 (Delores R @ Gage Station)	1E3 Acute	5.9	6.1	6.0	7.5	17	43	44	26	20	23	12	5.9	5.9
	30E3 Chronic	7.3	7.3	7.3	7.5	17	43	44	28	28	24	12	7.4	7.3

Table A-15

Low Flows for Wetlands Areas, the Unnamed Tributary to Silver Creek and the Side Channel to the Dolores River

Location	*Low Flow (cfs)*	*Annual*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Wetlands, Unnamed Tributary, and Side Channel	1E3 Acute	0	0	0	0	0	0	0	0	0	0	0	0	0
	30E3 Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0

IV. Technical Analysis

In-stream background data and low flows evaluated in sections II and III are ultimately used to determine the assimilative capacity of the receiving waters near the Rico-Argentine Mine area for pollutants of concern. It is the WQCD's approach to conduct a technical analysis of stream assimilative capacity using the lowest of the monthly low flows (referred to as the annual low flow) as calculated in the low flow analysis. However, based on a request by ARCO for the consideration of seasonal effluent discharges from the St. Louis Pond System, this WQA has been developed considering seasonal low flows in accordance with the following seasons:

- January through March
- April through September
- October through December

The WQCD's standard analysis consists of steady-state, mass-balance calculations for most pollutants and modeling for pollutants such as ammonia. The mass-balance equation is used by the WQCD to calculate the maximum allowable concentration of pollutants in the effluent, and accounts for the upstream concentration of a pollutant, critical low flow (minimal dilution), effluent flow and the water quality standard. The mass-balance equation is expressed as:

$$M_2 = \frac{M_3Q_3 - M_1Q_1}{Q_2}$$

where:

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow
Q_3 = Downstream flow ($Q_1 + Q_2$)
M_1 = In-stream background pollutant concentrations
M_2 = Calculated maximum allowable effluent pollutant concentration (a.k.a, the water quality-based effluent limitation (WQBEL))
M_3 = Maximum allowable in-stream pollutant concentration (water quality standards)

Note that in the establishment of M_1, the WQCD's Assessment Unit approach was considered. Specifically, it is the WQCD Assessment Unit's approach to establish M_1 equal to existing quality. Thus, the M_1 for dissolved metals, total metals, and cyanide will be equal to the 85th percentile ambient background concentration, and the M_1 for total recoverable metals will be equal to the 50th percentile ambient background concentration.

For purposes of establishing WQBELs when low flows are equal to zero, a modified version of the mass-balance equation is used. Specifically, when Q_1 equals zero, Q_2 equals Q_3, and the following results:

$$M_2 = M_3$$

Because the low flow (Q_1) for the wetlands areas, the unnamed tributary to Silver Creek upstream of the Argentine Seep, and the side channel of the Dolores River upstream of the Columbia Tailings Seep are assumed to equal zero, the assimilative capacity of these receiving waters for the pollutants of concern is equal to the in-stream water quality standards.

The above mass-balance approach to calculation of WQBELs is ideal when WQAs address a single point source discharge at a single discharge location. But, for WQAs involving multiple point sources at varying discharge locations with varying characteristics, a modified approach must be used as discussed at the end of this section.

Pollutants of Concern

As part of this WQA, cyanide and metals for which there are standards were evaluated. The pollutants of concern thus included:

- Total recoverable arsenic (As, Trec)
- Dissolved cadmium (Cd, Dis)
- Total recoverable trivalent chromium (Cr^{+3}, Trec)
- Dissolved trivalent chromium (Cr^{+6}, Dis)
- Dissolved copper (Cu, Dis)
- Free cyanide (CN, Free)
- Total recoverable iron (Fe, Trec)
- Dissolved lead (Pb, Dis)
- Dissolved manganese (Mn, Dis)
- Total mercury (Hg, Tot)
- Dissolved nickel (Ni, Dis)
- Dissolved selenium (Se, Dis)
- Dissolved silver (Ag, Dis)
- Dissolved zinc (Zn, Dis)

During assessment of the facility, nearby facilities, and receiving stream water quality, no additional parameters were identified as pollutants of concern.

Rico-Argentine Mine Area: The Rico-Argentine Mine area is located at SE quarter of Section 25, T40N, R11W in Dolores County.

There are three discharges located to the North and East of the Town of Rico:

- The Blaine Adit, which discharges an average of 1.5 gpm (0.0033 cfs) to Silver Creek. The discharge enters Silver Creek approximately 0.1 miles downstream from the beginning of stream segment COSJDO09.
- The Argentine Seep, which discharges an average of 51 gpm (0.11 cfs) to a tributary to Silver Creek. The tributary enters Silver Creek approximately 0.4 miles downstream from the beginning of stream segment COSJDO09.
- The St. Louis Ponds System, which discharges an average of 744 gpm (1.7 cfs) to the Dolores River. The discharge enters the Dolores River approximately 1.2 miles downstream from the beginning of stream segment COSJDO03.

There are four discharges located to the South of the Town of Rico which are historic mine drainage adits and seeps. These include:

- The Columbia Tailings Seep, which discharges at an estimated average of 0.052 cfs via a side channel to the Dolores River.
- The Rico Boy Adit, which discharges an average of 3.5 gpm (0.0078 cfs) to wetlands that drains to the Dolores River. The wetlands drain to the Dolores River at two points

approximately 2.1 and 2.2 miles downstream from the beginning of stream segment COSJDO03.

- The Santa Cruz Adit, which discharges an average of 22 gpm (0.049 cfs) to the same wetlands as the Rico Boy Adit.
- The Silver Swan Adit, which discharges an average of 45 gpm (0.10 cfs) to wetlands that are also fed by Sulfur Creek, that drain to the Dolores River. The wetlands drain to the Dolores River at approximately 2.3 miles downstream from the beginning of stream segment COSJDO03.

The analyses that follow include evaluations based on these flows, with the exception of the St. Louis Ponds flow. Representatives of ARCO requested that the following 85th percentile flows reflecting seasonal variations be used:

- January through March — 791 gpm (1.8 cfs)
- April through September — 1381 gpm (3.1 cfs)
- October through December — 956 gpm (2.1 cfs)

The WQCD procedure is to use the maximum of the monthly averages when determining the Q_2 to be used in the calculations of assimilative capacities. Consistent with WQCD procedure, the following flows were determined and used in later calculations:

- January through March — 1.3 MGD (2.0 cfs)
- April through September — 2.0 MGD (3.1 cfs)
- October through December — 1.4 MGD (2.2 cfs)

As noted above, seasonal flows were determined only for the St. Louis Ponds as a result of a request by ARCO. For all other discharges, the average of the measured discharge flows are used for the Q_2 except the Columbia Tailings Seep, which has no effluent discharge data. Therefore an estimated Q_2 flow was determined based on the incremental increase in the Dolores River basin flow from the confluence of Silver Creek to a point upstream of the Silver Swan Adit during low flow conditions.

Nearby Sources

An assessment of nearby facilities based on EPA's Permit Compliance System (PCS) database found three permitted dischargers in Dolores County. These were:

- COG582039, the Town of Dove Creek domestic Wastewater Treatment Plant (WWTP)
- COG582023, Lee, Richard domestic WWTP
- CO0045745, Lucas Property Holdings Gold Mine.

These facilities were located more than twenty miles from the Rico-Argentine Mine area and thus were not considered relevant to this assessment.

Technical Analyses for Scenarios 1 and 2

For the WQA for the Rico-Argentine Mine area, there are seven point source discharges that must be addressed at varying locations throughout the Dolores River basin. The characteristics including low flow, ambient upstream water quality concentrations, and hardness vary significantly throughout the basin. Furthermore, three different stream segments' standards and in-stream standards for metals at various locations must also be addressed. For this reason, the technical approach in the development of WQBELs for the seven point source discharges involved the following:

- Development of the maximum assimilative loading in lbs/day, which is the maximum load of pollutant that can be assimilated in a receiving water, at multiple locations
- Determination of background allocations in lbs/day, which is the load contributed by non-point sources for various zones in each segment
- Subtraction of the background allocations from the maximum assimilative loading to arrive at an available assimilative loading for the multiple dischargers
- Determination of the remaining allocations in lbs/day to distribute to individual point sources
- Calculation of the WQBELs in ug/l for each individual point source based on the allocations ultimately distributed.

The acute and chronic maximum assimilative loadings were calculated at the following locations:

- At the point of confluence of the Dolores River with the St. Louis Ponds based on the in-stream standards for stream segment COSJDO03 and the site-specific metals standards for the Dolores River downstream of the St. Louis Ponds, and a combination of the seasonal low flows of the Dolores River upstream of the St. Louis Ponds and the seasonal discharge flows, Q_2, of the St. Louis Ponds
- At the point of confluence of Silver Creek with the Blaine Adit based on the in-stream standards for stream segment COSJDO09 and the site-specific metal in-stream standards for Silver Creek downstream of the Blaine Adit, and a combination of the annual low flow of Silver Creek upstream of the Blaine Adit and the Q_2 flow of the Blaine Adit
- At the point of confluence of Silver Creek with the tributary containing the Argentine Seep based on the in-stream standards for stream segment COSJDO09 and the site-specific metal in-stream standards for Silver Creek downstream of the confluence of the tributary containing the Argentine Seep, and a combination of the annual low flow of Silver Creek upstream of the tributary containing the Argentine Seep and the Q_2 flow of the Argentine Seep
- At the point after the confluence of the Dolores River with the Columbia Tailings Seep, the Rico Boy, Santa Cruz, and Silver Swan Adits based on the in-stream standards for stream segment COSJDO03 and the site-specific metals' standards for the Dolores River downstream of the adits, and a combination of the annual low flow of the Dolores River upstream of the Silver Swan Adit (which includes the contributions of the Columbia Tailings Seep, and the Rico Boy and Santa Cruz Adits), the annual low flow of Sulfur Creek upstream of the Silver Swan wetlands, and the Q_2 flow of the Silver Swan Adit.

The background allocations were calculated at the following locations:

- Dolores River upstream of the St. Louis Ponds, based on ambient water quality data found at COSJDO03-0.4 and the acute and chronic low flows for the Dolores River upstream of the St. Louis Ponds (Scenario 2 only).
- Dolores River upstream of the St. Louis Ponds based on ambient water quality data found at COSJDO03-1.1 and the acute and chronic low flows for the Dolores River upstream of the St. Louis Ponds (Scenario 1only).

- Silver Creek upstream of the Blaine Adit based on ambient water quality data found at COSJDO09-0.1 and the acute and chronic low flows for Silver Creek upstream of the Blaine Adit.
- Silver Creek upstream of the tributary containing the Argentine Seep based on ambient water quality data found at COSJDO09-0.1 and the acute and chronic low flows for Silver Creek upstream of the tributary containing the Argentine Seep.
- Silver Creek downstream of the tributary containing the Argentine Seep calculated based on ambient water quality data found at COSJDO03-0.4 and the acute and chronic low flows for Silver Creek from a point downstream of the tributary containing the Argentine Seep to the mouth of Silver Creek. Note that the ambient water quality data from locations upstream in the Dolores River versus that found upstream in Silver Creek was used in this analysis to better simulate the downstream water quality of Silver Creek at the mouth.
- Dolores River downstream of the confluence of Silver Creek and upstream of the confluence of the wetlands drainage containing the Silver Swan Adit. This was based on ambient water quality data found at COSJDO03-0.4 and acute and chronic low flows of 0.2 cfs, which is the increase in flows between these two points, less adits and seep contributions.

Prior to distribution of the available assimilative loadings and calculation of the WQBELs for individual point sources, further adjustments were required. These adjustments were required because the Dolores River Basin in the area around the town of Rico is very narrow. If the entire dilution/assimilative capacity is allocated to the St. Louis Ponds at the upstream location, there is not enough assimilative capacity in the basin at points downstream to accommodate the assimilative capacities required for the other point source contributors. Thus, adjustments to the assimilative load available to the St. Louis Ponds were made to ensure that assimilative loadings for the Columbia Tailings Seep, and the Rico Boy, Santa Cruz and Silver Swan Adits were available.

The chronic and acute assimilative capacities for Scenario 1 are set forth in Tables A-16 and A-17, respectively, and the chronic and acute assimilative capacities for Scenario 2 are set forth in Tables A-18 and A-19, respectively. All adjustments are explained in the respective tables contained below. Furthermore, each table also indicates whether or not the current maximum discharge concentration of each point source is less than the derived WQBEL for that point source.

Table A-16
Chronic Assimilative Capacities for Metals for Scenario 1

Parameter	*St. Louis Ponds WQBELs (Jan-Mar)*	*St. Louis Ponds WQBELs (Apr-Sep)*	*St. Louis Ponds WQBELs (Oct-Dec)*	*Blaine Adit WQBELs*	*Argentine Seep WQBELs*	*Columbia Tailings Seep WQBELs*	*Rico Boy Adit WQBELs*	*Santa Cruz Adit WQBELs*	*Silver Swan Adit WQBELs*	*Notes*
As, Trec (ug/l)	286	413	264	5832	50	100	100	100	100	1,2
Cd, Dis (ug/l)	8.0	12	7.5	-73	3.3	6.2	6.2	6.2	6.2	3
Cr^{+3}, Trec (ug/l)	285	411	264	5852	50	100	100	100	100	2,4
Cr^{+6}, Dis (ug/l)	31	45	29	644	11	11	11	11	11	5
Cu, Dis (ug/l)	36	54	33	-102	29	29	29	29	29	6
CN, Free (ug/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Fe, Trec (ug/l)	1215	1642	1183	3630	1000	1000	1000	1000	1000	7
Pb, Dis (ug/l)	9.4	15	8.8	-61	10	11	11	11	11	8
Mn, Dis (ug/l)	4745	6873	4420	83372	2618	2618	2618	2618	2618	9
Hg, Tot (ug/l)	0.028	0.041	0.026	0.59	0.010	0.010	0.010	0.010	0.010	10
Ni, Dis (ug/l)	215	325	199	2607	168	168	168	168	168	11
Se, Dis (ug/l)	12	17	11	269	4.6	4.6	4.6	4.6	4.6	12
Ag, Dis (ug/l)	1.2	2.0	1.1	3.3	0.81	3.5	3.5	3.5	3.5	13
Zn, Dis (ug/l)	330	620	309	-4800	316	382	382	382	382	14

Table A-16 (Continued)
Note 1: Adjustments were made to the chronic total recoverable arsenic allocations by deducting 0.141 lbs/day from the available assimilative loadings for the St. Louis Ponds.
Note2: Although no chronic standard is in place for the Argentine Seep for the noted parameters, an available assimilative loading was determined and WQBELs assigned to ensure that adequate downstream assimilative capacities are available
Note 3: Adjustments were made to the chronic dissolved cadmium allocations by deducting 0.012 lbs/day from the available assimilative loadings for the St. Louis Ponds. Available assimilative loadings were not adequate and thus the maximum concentrations being discharged by the St. Louis Ponds during the months of October through March, the Argentine Seep, the Columbia Tailings Seep, and the Rico Boy Adit exceeded the derived WQBELs. Due to high upstream concentration of cadmium in relationship to the allowable in-stream concentration dictated by hardness downstream of the Blaine Adit, no discharge of cadmium is allowed from the Blaine Adit.
Note 4: Adjustments were made to the chronic total recoverable trivalent chromium allocations by deducting 0.141 lbs/day from the available assimilative loadings for the St. Louis Ponds.
Note 5: Adjustments were made to the chronic dissolved hexavalent chromium allocations by deducting 0.019 lbs/day from the available assimilative loadings for the St. Louis Ponds.
Note 6: Adjustments were made to the chronic dissolved copper allocations by deducting 0.052 lbs/day from the available assimilative loadings for the St. Louis Ponds. The available assimilative loading was not adequate and thus the maximum concentration being discharged by the Columbia Tailings Seep exceeded the derived WQBEL. Due to high upstream concentration of copper in relationship to the allowable in-stream concentration dictated by hardness downstream of the Blaine Adit, no discharge of copper is allowed from the Blaine Adit.
Note 7: Adjustments were made to the chronic total recoverable iron allocations by deducting 3.292 lbs/day from the available assimilative loadings for the St. Louis Ponds.Because no standard for total recoverable iron is in place for Silver Creek, the Blaine Adit was allocated its maximum concentration. Available assimilative loadings were not adequate and thus the maximum concentrations being discharged by the Rico Boy Adit and the Silver Swan Adit exceeded the derived WQBELs.
Note 8: Adjustments were made to the chronic dissolved lead allocations by deducting 0.027 lbs/day from the available assimilative loadings for the St. Louis Ponds. Due to high upstream concentration of lead in relationship to the allowable in-stream concentration dictated by hardness downstream of the Blaine Adit, no discharge of lead is allowed from the Blaine Adit.
Note 9: Adjustments were made to the chronic dissolved manganese allocations by deducting 4.773 lbs/day from the available assimilative loadings for the St. Louis Ponds. Available assimilative loadings were not adequate and thus the maximum concentrations being discharged by the Argentine Seep and the Columbia Tailings Seep exceeded the derived WQBELs.
Note 10: Adjustments were made to the chronic total mercury allocations by deducting 0.00002 lbs/day from the available assimilative loadings for the St. Louis Ponds. The available assimilative loading was not adequate and thus the maximum concentration being discharged by the Silver Swan Adit exceeded the derived WQBEL.
Note 11: Adjustments were made to the chronic dissolved nickel allocations by deducting 0.317 lbs/day from the available assimilative loadings for the St. Louis Ponds.
Note 12: Adjustments were made to the chronic dissolved selenium allocations by deducting 0.009 lbs/day from the available assimilative loadings for the St. Louis Ponds. The available assimilative loading was not adequate and thus the maximum concentration being discharged by the Columbia Tailings Seep exceeded the derived WQBEL.
Note 13: Adjustments were made to the chronic dissolved silver allocations by deducting 0.006 lbs/day from the available assimilative loadings for the St. Louis Ponds.
Note 14: Adjustments were made to the chronic dissolved zinc allocations by deducting 2.247 lbs/day from the available assimilative loadings for the St. Louis Ponds. Available available assimilative loadings were not adequate and thus the maximum concentration being discharged by all point sources exceeded the derived WQBELs. Due to high upstream concentration of zinc in relationship to the allowable in-stream concentration of zinc dictated by hardness downstream of the Blaine Adit, no discharge of zinc is allowed from the Blaine Adit.

Table A-17
Acute Assimilative Capacities for Metals and Cyanide for Scenario 1

Parameter	*St. Louis Ponds WQBELs (Jan-Mar)*	*St. Louis Ponds WQBELs (Apr-Sep)*	*St. Louis Ponds WQBELs (Oct-Dec)*	*Blaine Adit WQBELs*	*Argentine Seep WQBELs*	*Columbia Tailings Seep WQBELs*	*Rico Boy Adit WQBELs*	*Santa Cruz Adit WQBELs*	*Silver Swan Adit WQBELs*	*Notes*
As, Trec (ug/l)	NA	NA	NA	NA	50	NA	NA	NA	NA	1
Cd, Dis (ug/l)	15	28	14	-4	17	19	19	19	19	2
Cr^{+3}, Trec (ug/l)	NA	NA	NA	NA	50	NA	NA	NA	NA	1
Cr^{+6}, Dis (ug/l)	37	65	34	598	16	16	16	16	16	4
Cu, Dis (ug/l)	46	85	42	62	50	50	50	50	50	5
CN, Free (ug/l)	12	20	11	187	5.0	5.0	5.0	5.0	5.0	6
Fe, Trec (ug/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Pb, Dis (ug/l)	236	447	215	1864	281	281	281	281	281	7
Mn, Dis (ug/l)	7509	13247	6859	100308	4738	4738	4738	4738	4738	8
Hg, Tot (ug/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Ni, Dis (ug/l)	1565	2910	1423	15076	1513	1513	1513	1513	1513	9
Se, Dis (ug/l)	42	73	38	687	18	18	18	18	18	10
Ag, Dis (ug/l)	8.5	18	7.7	56	18	22	22	22	22	11
Zn, Dis (ug/l)	249	616	227	11428	379	379	379	379	379	12

Note 1: No adjustments were made to the allocations for the indicated parameters because the available assimilative capacities are adequate to accomodate the derived WQBELs and the derived WQBELs are greater than the maximum concentration of the indicated parameters being discharged at each point source.

Note 2: Adjustments were made to the acute dissolved cadmium allocations by deducting 0.041 lbs/day from the available assimilative loadings for the St. Louis Ponds. The available assimilative loading was not adequate and thus the maximum concentration being discharged by the Rico Boy Adit exceeded the derived WQBEL. Due to high upstream concentration of cadmium in relationship to the allowable in-stream concentration dictated by hardness downstream of the Blaine Adit, no discharge of cadmium is allowed from the Blaine Adit.

Note 3: Adjustments were made to the acute dissolved trivalent chromium allocations by deducting 3.963 lbs/day from the available assimilative loadings for the St. Louis Ponds. Note that although no standard is in place for dissolved trivalent chromium at the Argentine Seep, an available assimilative loading was determined and WQBELs assigned to ensure that adequate downstream assimilative capacities are available.

Note 4: Adjustments were made to the acute dissolved hexavalent chromium allocations by deducting 0.039 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 5: Adjustments were made to the acute dissolved copper allocations by deducting 0.098 lbs/day from the available assimilative loadings for the St. Louis Ponds. Available assimilative loadings were not adequate and thus the maximum concentrations being discharged by the Blaine Adit and the Columbia Tailings Seep exceeded the derived WQBELs.

Note 6: Adjustments were made to the acute free cyanide allocations by deducting 0.012 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 7: Adjustments were made to the acute dissolved lead allocations by deducting 0.604 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 8: Adjustments were made to the acute dissolved manganese allocations by deducting 11.111 lbs/day from the available assimilative loadings for the St. Louis Ponds. Available assimilative loadings were not adequate and thus the maximum concentrations being discharged by the Blaine Adit and the Argentine Seep exceeded the derived WQBELs.

Note 9: Adjustments were made to the acute dissolved nickel allocations by deducting 3.373 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 10: Adjustments were made to the acute dissolved selenium allocations by deducting 0.045 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 11: Adjustments were made to the acute dissolved silver allocations by deducting 0.043 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 12: Adjustments were made to the acute dissolved zinc allocations by deducting 2.234 lbs/day from the available assimilative loadings for the St. Louis Ponds. Available available assimilative loadings were not adequate and thus the maximum concentrations being discharged by all point sources exceeded the derived WQBELs.

Table A-18
Chronic Assimilative Capacities for Metals for Scenario 2

Parameter	St. Louis Ponds WQBELs (Jan-Mar)	St. Louis Ponds WQBELs (Apr-Sep)	St. Louis Ponds WQBELs (Oct-Dec)	Blaine Adit WQBELs	Argentine Seep WQBELs	Columbia Tailings Seep WQBELs	Rico Boy Adit WQBELs	Santa Cruz Adit WQBELs	Silver Swan Adit WQBELs	Notes
As, Trec (ug/l)	296	419	273	0	50	100	100	100	100	1,2
Cd, Dis (ug/l)	8.4	13	7.8	0	5.5	6.2	6.2	6.2	6.2	3
Cr^{+3}, Trec (ug/l)	295	417	272	0	50	100	100	100	100	2,4
Cr^{+6}, Dis (ug/l)	32	46	30	0	11	11	11	11	11	5
Cu, Dis (ug/l)	36	54	34	0	29	29	29	29	29	6
CN, Free (ug/l)	NA	NA	NA	0	NA	NA	NA	NA	NA	
Fe, Trec (ug/l)	1221	1646	1189	0	1000	1000	1000	1000	1000	7
Pb, Dis (ug/l)	10	16	9.3	0	11	11	11	11	11	8
Mn, Dis (ug/l)	5517	7985	5107	0	2618	2618	2618	2618	2618	9
Hg, Tot (ug/l)	0.029	0.042	0.027	0	0.010	0.010	0.010	0.010	0.010	10
Ni, Dis (ug/l)	220	328	203	0	168	168	168	168	168	11
Se, Dis (ug/l)	12	18	12	0	4.6	4.6	4.6	4.6	4.6	12
Ag, Dis (ug/l)	1.9	3.0	1.7	0	0.81	3.5	3.5	3.5	3.5	13
Zn, Dis (ug/l)	334	622	313	0	382	382	382	382	382	14

Note 1: Adjustments were made to the chronic total recoverable arsenic allocations by deducting 0.037 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 2: Although no chronic standard is in place for the Argentine Seep for the noted parameters, an available assimilative loading was determined and WQBELs assigned to ensure that adequate downstream assimilative capacities are available

Note 3: Adjustments were made to the chronic dissolved cadmium allocations by deducting 0.012 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 4: Adjustments were made to the chronic dissolved trivalent chromium allocations by deducting 0.037 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 5: Adjustments were made to the chronic dissolved hexavalent chromium allocations by deducting 0.008 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 6: Adjustments were made to the chronic dissolved copper allocations by deducting 0.05 lbs/day from the available assimilative loadings for the St. Louis Ponds. The available assimilative loading was not adequate and thus the maximum concentration being discharged by the Columbia Tailings Seep exceeded the derived WQBEL.

Note 7: Adjustments were made to the chronic total recoverable iron allocations by deducting 3.227 lbs/day from the available assimilative loadings for the St. Louis Ponds. Available assimilative loadings were not adequate and thus the maximum concentrations being discharged by the Rico Boy Adit and the Silver Swan Adit exceeded the derived WQBELs.

Note 8: Adjustments were made to the chronic dissolved lead allocations by deducting 0.027 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 9: Adjustments were made to the chronic dissolved manganese allocations by deducting 3.29 lbs/day from the available assimilative loadings for the St. Louis Ponds. Available assimilative loadings were not adequate and thus the maximum concentrations being discharged by the Argentine Seep and the Columbia Tailings Seep exceeded the derived WQBELs.

Note 10: Adjustments were made to the chronic total mercury allocations by deducting 0.00001 lbs/day from the available assimilative loadings for the St. Louis Ponds. The available assimilative loading was not adequate and thus the maximum concentration being discharged by the Silver Swan Adit exceeded the derived WQBEL.

Note 11: Adjustments were made to the chronic dissolved nickel allocations by deducting 0.27 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 12: Adjustments were made to the chronic dissolved selenium allocations by deducting 0.004 lbs/day from the available assimilative loadings for the St. Louis Ponds. The available assimilative loading was not adequate and thus the maximum concentration being discharged by the Columbia Tailings Seep exceeded the derived WQBEL.

Note 13: Adjustments were made to the chronic dissolved silver allocations by deducting 0.005 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 14: Adjustments were made to the chronic dissolved zinc allocations by deducting 2.201 lbs/day from the available assimilative loadings for the St. Louis Ponds. Available available assimilative loadings were not adequate and thus the maximum concentration being discharged by all point sources exceeded the derived WQBELs.

Table A-19
Acute Assimilative Capacities for Metals and Cyanide for Scenario 2

Parameter	St. Louis Ponds WQBELs (Jan-Mar)	St. Louis Ponds WQBELs (Apr-Sep)	St. Louis Ponds WQBELs (Oct-Dec)	Blaine Adit WQBELs	Argentine Seep WQBELs	Columbia Tailings Seep WQBELs	Rico Boy Adit WQBELs	Santa Cruz Adit WQBELs	Silver Swan Adit WQBELs	Notes
As, Trec (ug/l)	NA	NA	NA	0	50	NA	NA	NA	NA	1
Cd, Dis (ug/l)	15	29	14	0	17	19	19	19	19	2
Cr^{+3}, Trec (ug/l)	NA	NA	NA	0	50	NA	NA	NA	NA	1
Cr^{+6}, Dis (ug/l)	38	66	35	0	16	16	16	16	16	4
Cu, Dis (ug/l)	46	85	42	0	50	50	50	50	50	5
CN, Free (ug/l)	12	21	11	0	5.0	5.0	5.0	5.0	5.0	6
Fe, Trec (ug/l)	NA	NA	NA	0	NA	NA	NA	NA	NA	
Pb, Dis (ug/l)	240	450	218	0	281	281	281	281	281	7
Mn, Dis (ug/l)	8165	14376	7427	0	4738	4738	4738	4738	4738	8
Hg, Tot (ug/l)	NA	NA	NA	0	NA	NA	NA	NA	NA	
Ni, Dis (ug/l)	1590	2926	1446	0	1513	1513	1513	1513	1513	9
Se, Dis (ug/l)	43	74	39	0	18	18	18	18	18	10
Ag, Dis (ug/l)	9	19	8	0	20	22	22	22	22	11
Zn, Dis (ug/l)	268	628	245	0	379	379	379	379	379	12

Note 1: No adjustments were made to the allocations for the indicated parameters because the available assimilative capacities are adequate to accomodate the derived WQBELs and the derived WQBELs are greater than the maximum concentration of the indicated parameters being discharged at each point source.

Note 2: Adjustments were made to the acute dissolved cadmium allocations by deducting 0.041 lbs/day from the available assimilative loadings for the St. Louis Ponds. The available assimilative loading was not adequate and thus the maximum concentration being discharged by the Rico Boy Adit exceeded the derived WQBEL.

Note 3: Adjustments were made to the acute dissolved trivalent chromium allocations by deducting 3.634 lbs/day from the available assimilative loadings for the St. Louis Ponds. Note that although no standard is in place for dissolved trivalent chromium at the Argentine Seep, an available assimilative loading was determined and WQBELs assigned to ensure that adequate downstream assimilative capacities are available.

Note 4: Adjustments were made to the acute dissolved hexavalent chromium allocations by deducting 0.028 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 5: Adjustments were made to the acute dissolved copper allocations by deducting 0.097 lbs/day from the available assimilative loadings for the St. Louis Ponds. The available assimilative loading was not adequate and thus the maximum concentration being discharged by the Columbia Tailings Seep exceeded the derived WQBEL.

Note 6: Adjustments were made to the acute free cyanide allocations by deducting 0.009 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 7: Adjustments were made to the acute dissolved lead allocations by deducting 0.571 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 8: Adjustments were made to the acute dissolved manganese allocations by deducting 9.327 lbs/day from the available assimilative loadings for the St. Louis Ponds. The available assimilative loading was not adequate and thus the maximum concentration being discharged by the Argentine Seep exceeded the derived WQBEL.

Note 9: Adjustments were made to the acute dissolved nickel allocations by deducting 3.105 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 10: Adjustments were made to the acute dissolved selenium allocations by deducting 0.033 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 11: Adjustments were made to the acute dissolved silver allocations by deducting 0.043 lbs/day from the available assimilative loadings for the St. Louis Ponds.

Note 12: Adjustments were made to the acute dissolved zinc allocations by deducting 2.031 lbs/day from the available assimilative loadings for the St. Louis Ponds. Available available assimilative loadings were not adequate and thus the maximum concentration being discharged by all point sources exceeded the derived WQBELs.

V. Antidegradation Review

As set out in *The Basic Standards and Methodologies for Surface Water*, Section 31.8(2)(b), an antidegradation analysis is required except in cases where the receiving water is designated as "Use Protected." Note that "Use Protected" waters are waters "that the Commission has determined do not warrant the special protection provided by the outstanding waters designation or the antidegradation review process" as set out in Section 31.8(2)(b). The antidegradation section of the regulation became effective in December 2000, and therefore antidegradation considerations are applicable to this WQA development.

According to the *Classifications and Numeric Standards for San Juan River and Dolores River Basins*, stream segment COSJDO09 is Use Protected. Because the receiving waters are designated as Use Protected, no antidegradation review is necessary in accordance with the regulations. Thus, for purposes of this WQA, antidegradation review requirements have been met for the Blaine Adit.

According to the *Classifications and Numeric Standards for San Juan River and Dolores River Basins*, stream segments COSJDO03 and COSJDO05 are Undesignated. Thus, an antidegradation review is required for these segments if new or increased impacts are found to occur.

Consistent with current WQCD procedures, the baseline water quality (BWQ) for pollutants of concern should be established so that it can be used as part of antidegradation reviews. BWQ is defined by the WQCD as the condition of the water quality as of September 30, 2000. Furthermore, the WQCD specifies that BWQ will include the influence of the discharger if it was in place on September 30, 2000. Accordingly, the BWQ is calculated based on the following equation:

$$BWQ = \frac{M_{eff}Q_{eff} + M_{u/s}Q_{u/s}}{Q_{eff} + Q_{u/s}}$$

where:

BWQ = Baseline water quality concentration
$Q_{u/s}$ = Upstream chronic low flow (30E3)
$M_{u/s}$ = Upstream background pollutant concentration at the existing quality
Q_{eff} = 2-year average flow
M_{eff}= 2-year average effluent pollutant concentration

For purposes of establishing BWQs when low flows are equal to zero, a modified version of the equation above is used. When the upstream low flow, $Q_{u/s}$, is zero, the following results:

$$BWQ = M_{eff}$$

The antidegradation requirements outlined in *The Basic Standards and Methodologies for Surface Water* specify that chronic numeric standards be used; however, where there is only an acute standard, the acute standard and low flow should be used. Chronic standards were available for all pollutants except cyanide, total recoverable arsenic and total recoverable chromium for Scenarios 1

STATE OF COLORADO

Bill Owens, Governor
Jane E. Norton, Executive Director

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Colorado Department of Public Health and Environment

January 14, 2002

Mr. Chuck Stilwell, PE
ARCO Environmental Remediation
307 East Park Street, Suite 400
Anaconda, Montana 59711

Re: Rico-Argentine Mine Area Water Quality Assessment

Dear Mr. Stilwell:

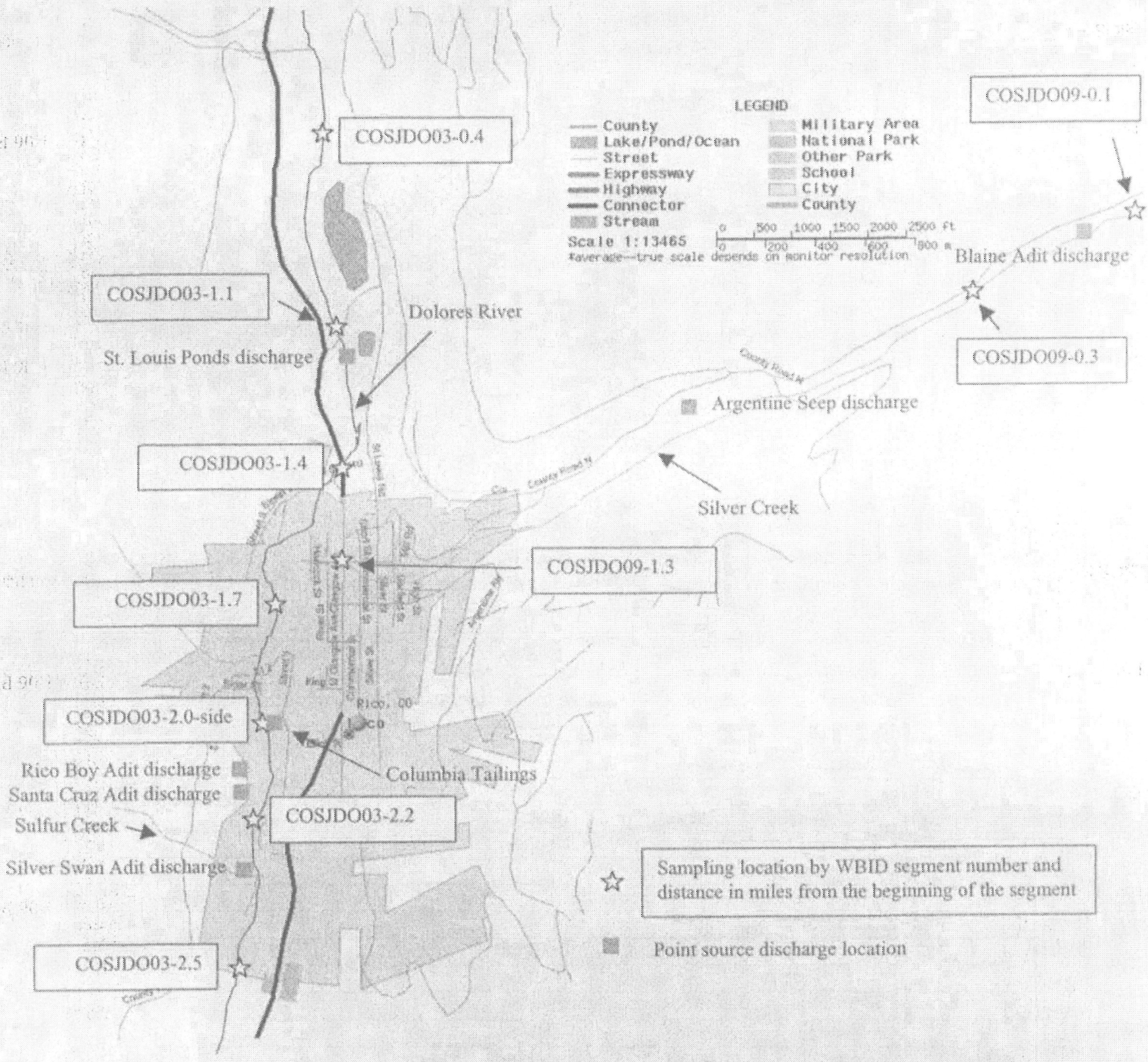
The Colorado Department of Public Health and Environment, Water Quality Control Division, has completed your request for preliminary permit limits for the Rico-Argentine Mine area.

The assessment encompassed seven point source discharges, identified in the table below, that were located within the three miles of the Rico-Argentine Mine area. The findings of the assessment indicate that during times of low flow, there is a serious zinc water quality problem that results in the point source discharge contributions exceeding the stream's assimilative capacity for zinc by 31.6 lbs/day.

Table of Available Zinc Assimilative Capacities and Zinc Contributions	
Maximum Assimilative Loading, Background, and Facility Contributions at the 85th Percentile	***Loading in lbs/day***
Acute Maximum Assimilative Loading	4.95
Background Allocation	-0.95
St. Louis Ponds Point Source Contribution	-17.81
Blaine Adit Point Source Contribution	-8.01
Argentine Seep Point Source Contribution	-3.75
Columbia Tailings Seep Point Source Contribution	-4.81
Rico Boy Adit Point Source Contribution	-0.39
Santa Cruz Adit Point Source Contribution	-0.35
Silver Swan Adit Point Source Contribution	-0.48
Deficit	***-31.60***

Enclosed you will find a copy of the Rico-Argentine Mine area water quality assessment (WQA), which includes the detailed findings of two evaluated scenarios. These two scenarios were based on the most conservative of assumptions, and one of the scenarios includes the potential results of the recently undertaken changes at the mine area.

Figure A-1
Study Area



water discharge as it would be impractical to account for mine discharges without assessing the surface runoff flow and its associated constituents that are commingled prior to discharge.

Dolores River

Silver Creek

TABLE 9
Surface Water Dissolved Inorganic (ICP-AES) Analytical Results (concentrations in micrograms per liter (µg/L))

EPA Sample ID: / Sample Date: / Station Location:	MH1G14 9/21/2005 DR12ASWF09	MH1G16 9/21/2005 DR011SWF09	MH1G18 9/22/2005 DR008SWF09	MH1G20 9/22/2005 DRSC1SWF09	MH1G22 9/22/2005 DRSC4SWF09	MH1G24 9/22/2005 DR007SWF09	MH1G26 9/22/2005 DR004SWF09	MH1G28 9/22/2005 DR001SWF09	MH1G30 9/21/2005 DR931SWF09	MH1G32 9/21/2005 DR932SWF09
Aluminum	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Antimony	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U
Arsenic	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Barium	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Beryllium	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Cadmium	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Calcium	68700	71400	66900	83600	34400	60600	35200	29700	51400	32400
Chromium	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Cobalt	[0.93]	[1.0]	[1.9]	[1.3]	50 U	[1.9]	[1.7]	50 U	[1.1]	[1.1]
Copper	25 U	25 U	25 U	[1.8]	25 U	25 U	25 U	25 U	25 U	25 U
Iron	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Lead	10 U	10 U	10 U	10 U	10 U	[4.3]	10 U	10 U	[5.5]	10 U
Magnesium	8600	8740	8240	9000	5000 U	7700	5260	5000 U	7830	5810
Manganese	26	141	257	94	[4.2]	258	[13.6]	[7.5]	[9.7]	[4.6]
Nickel	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U
Potassium	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U
Selenium	35 U	35 U	35 U	35 U	[14.7]	35 U	35 U	35 U	35 U	35 U
Silver	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Sodium	[4050]	[3810]	[3670]	[1920]	[1760]	[3730]	[2400]	[2520]	10500	[1830]
Thallium	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Vanadium	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Zinc	[24.9]	73	139	571	[1.5]	72	[4.2]	[2.1]	[3.2]	[2.5]

[ ] = The associated numerical value was detected below the CRQL, but greater than the method detection limit and is therefore an estimate (qualified by laboratory).
U = The analyte was not detected at or above the IDL. J- = The associated numerical value is an estimated quantity but the result may be biased low.
= Detection limit is above standard.

C 223 265/757*
A 257 305

219
252

Dolores River

Silver Creek

TABLE 11

Surface Water Dissolved Inorganic (ICP-MS) Analytical Results (concentrations in micrograms per liter (µg/L)

EPA Sample ID:	MH1FZ4	MH1FZ6	MH1FZ8	MH1G00	MH1G02	MH1G04	MH1G06	MH1G08	MH1G10	MH1G12
Sample Date:	9/21/2005	9/21/2005	9/21/2005	9/22/2005	9/21/2005	9/21/2005	9/21/2005	9/21/2005	9/21/2005	9/21/2005
Station Location:	DR018SWF09	DR017SWF09	DR941SWF09	DR942SWF09	DR015SWF09	DR014SWF09	DRWD1SWF09	DR13BSWF09	DR12BSWF09	DRBC1SWF09
Antimony	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Arsenic	[0.56]	[0.76]	[0.81]	[0.69]	[0.61]	[0.86]	1.1	[0.32]	[0.33]	[0.37]
Barium	78.5	123	121	124	112	109	77.4	146	142	165
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[0.16]	1.0 U	1.0 U
Chromium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cobalt	1.3	1.5	1.4	1.4	1.4	1.2	1.6	1.1	1.3	1.4
Copper	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Lead	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Manganese	5.9	29.4	33.7	31.9	9.9	13.7	11.2	14.4	8.9	5.1
Nickel	1.1	1.2	1.1	1.2	1.1	1.0	1.2	2.0	[0.86]	[0.81]
Selenium	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Silver	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Thallium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vanadium	[0.32]	[0.23]	[0.26]	[0.23]	[0.21]	[0.26]	[0.26]	[0.28]	[0.23]	[0.26]
Zinc	4.8 J	5 J	3.5 UJ	3.6 UJ	3.7 UJ	4.9 J	2.4 UJ	6.3 J	8.6 J	6.5 J

EPA Sample ID:	MH1G14	MH1G16	MH1G18	MH1G20	MH1G22	MH1G24	MH1G26	MH1G28	MH1G30	MH1G32
Sample Date:	9/21/2005	9/21/2005	9/22/2005	9/22/2005	9/22/2005	9/22/2005	9/22/2005	9/22/2005	9/21/2005	9/21/2005
Station Location:	DR12ASWF09	DR011SWF09	DR008SWF09	DRSC1SWF09	DRSC4SWF09	DR007SWF09	DR004SWF09	DR001SWF09	DR931SWF09	DR932SWF09
Antimony	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Arsenic	[0.38]	[0.31] J	[0.40]	[0.32]	[0.88]	[0.44]	[0.33]	[0.36]	1.0 U	1.0 U
Barium	109	80.6	62.1	84.1	125	60.1	71.6	54.4	113	162
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	[0.15]	[0.45]	[0.68]	2.4	1.0 U	[0.51]	1.0 U	1.0 U	1.0 U	1.0 U
Chromium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cobalt	1.1	1.2	1.6	1.5	[0.20]	1.7	1.4	[0.30]	1.1	1.2
Copper	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Lead	1.0 U	1.0 U	1.0 U	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Manganese	23.6	138	237	87.5	4.3	243	13.3	7.7	9.3	4.6
Nickel	1.2	1.7	1.6	2.1	[0.57]	1.7	[0.88]	[0.83]	1.0	[0.64]
Seleniuim	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	[0.54]	5.0 U	[0.75]	5.0 U	[0.69]
Silver	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Thallium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vanadiuim	[0.29]	[0.15]	[0.09]	[0.07]	[0.40]	[0.10]	[0.16]	[0.16]	[0.28]	[0.28]
Zinc	24.5 J	71.3 J	130 J	540 J	2.0 UJ	69.3 J	3.0 UJ	2.0 UJ	3.2 UJ	2.9 UJ

U = The analyte was not detected at or above the Instrument Detection Limit (IDL).
J = The associated numerical value is an estimated quantity and is the approximate concentration of the analyte in the sample. U = The analyte was not detected at or above the IDL.
[ ] = The associated numerical value was detected below the CRQL, but greater than the method detection limit and is therefore a estimate (qualified by the laboratory).
UJ = The reported quantitation limit is estimated because Quality Control criteria were not met. The element or compound may or may not be present in the sample.

DRIVER
SILVER CREEK

TABLE 14
Dolores River Basin Water Quality Standards (Concentrations in micrograms per liter (µg/L)) (continued)

Sample ID	DR12A	DR011	DR008	DRSC1	DRSC4	DR007	DR004	DR001
Stream Segment Identifier	3	3	3	9	5	3	2	2
Calcium (Total)	70500	71000	65700	82500	33200	62600	38900	74800
Magnesium (Total)	8730	8830	8170	8870	5000	9080	5960	11800
Hardness ***(milligrams per liter (mg/L))**	212	214	198	243	103	194	122	235
Arsenic Numeric Std Acute (Total)	NA	NA	NA	NA	50	NA	50	50
Arsenic Numeric Std Chronic (Total)	100	100	100	100	NA	100	50	50
Cadmium TVS Chronic	59	60	57	60	40	61	45	74
Cadmium TVS Acute	529	465	428	NA	NA	479	NA	NA
Cadmium TVS Acute (trout)	NA	NA	NA	10	4	NA	5	9
Chromium III Numeric Std Chronic	100	100	100	100	NA	100	50	50
Chromium III Numeric Std Acute	NA	NA	NA	NA	50	NA	NA	NA
Chromium VI Numeric Std Chronic	11	11	11	11	11	11	11	11
Chromium VI Acute Numeric Std Acute	16	16	16	16	16	16	16	16
Copper TVS Chronic	17	17	16	19	9	16	11	19
Copper TVS Acute	27	27	26	31	14	25	16	30
Iron Numeric Std Water Supply Chronic	NA	NA	NA	NA	300	NA	300	300
Iron Numeric Std Chronic (Total)	1000	1000	1000	NA	1000	1000	1000	1000
Lead TVS Chronic	6	6	5	7	3	5	3	6
Lead TVS Acute	145	146	134	167	67	132	80	162
Manganese Water Supply Chronic	NA	NA	NA	NA	NA	NA	50	50
Manganese Numeric Std Chronic	NA	NA	NA	NA	NA	NA	NA	NA
Manganese TVS Chronic	2119	2124	2070	2216	1669	2056	1761	2194
Manganese TVS Acute	3835	3845	3747	4011	3020	3721	3187	3971
Mercury Numeric Std Chronic (Total)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nickel TVS Chronic	98	99	93	110	54	91	61	107
Nickel TVS Acute	884	890	833	991	482	819	553	966
Selenium Numeric Std Chronic	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Selenium Numeric Std Acute	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4
Silver TVS Chronic (trout)	NA	NA	NA	0.34	0.08	NA	0.11	0.33
Silver TVS Chronic	1.17	1.18	1.03	NA	NA	1.00	NA	NA
Silver TVS Acute	7.4	7.5	6.6	9.3	2.2	6.3	2.8	8.8
Zinc TVS Chronic	223	225/274	210/257	250/670*/305/757	122/147	207/252	140/169	244
Zinc TVS Acute	221	223/238	209/223	248/NA*/265/—	121/127	205/219	138/147	242

U = not detected. J = estimate because quality control criteria (QCC) were not met.
B = estimate because analyte is present at concentration below the contract required detection limit (CRDL).
Shaded where analyte concentration exhibits significance above background.
NA = No standard promulgated for this analyte in this segment.
☐ = Concentration detected exceeds the standard or the detection limit was higher than the standard.

UJ = not detected and detection limit (DL) is estimated because QCC were not met.
BJ = estimate because analyte is present below CRDL and QCC were not met
TVS= Table Value Standards are hardness based for dissolved metals concentrations
* = Temporary modification for zinc in segment 9 (670 and NA) expires 12/31/06.

TABLE 14
Dolores River Basin Water Quality Standards (Concentrations in micrograms per liter (µg/L))

Sample ID	DR018	DR017	DR015	DR014	DRWD1	DR13B	DR12B	DRBC1
Stream Segment Identifier	4	4	4	4	10	4	4	5
Calcium (Total)	32100	52700	51600	53200	44500	62100	48200	33200
Magnesium (Total)	5390	8050	7980	8110	7810	8330	7120	5930
Hardness ***(milligrams per liter (mg/L))**	102	165	162	166	143	189	150	107
Arsenic Numeric Std Acute (Total)	50	50	50	50	50	50	50	50
Arsenic Numeric Std Chronic (Total)	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium TVS Chronic	42	56	56	56	55	57	51	45
Cadmium TVS Acute	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium TVS Acute (trout)	4	6	6	6	5	7	6	4
Chromium III Numeric Std Chronic	NA	NA	NA	NA	NA	NA	NA	NA
Chromium III Numeric Std Acute	50	50	50	50	50	50	50	50
Chromium VI Numeric Std Chronic	11	11	11	11	11	11	11	11
Chromium VI Acute Numeric Std Acute	16	16	16	16	16	16	16	16
Copper TVS Chronic	9	14	14	14	12	15	13	10
Copper TVS Acute	14	22	21	22	19	25	20	14
Iron Numeric Std Water Supply Chronic	300	300	300	300	300	300	300	300
Iron Numeric Std Chronic (Total)	1000	1000	1000	1000	1000	1000	1000	1000
Lead TVS Chronic	3	4	4	4	4	5	4	3
Lead TVS Acute	66	111	109	112	95	128	100	70
Manganese Water Supply Chronic	NA	NA	NA	NA	50	NA	NA	NA
Manganese Numeric Std Chronic	NA	NA	NA	NA	50	NA	NA	NA
Manganese TVS Chronic	1662	1948	1936	1954	1860	2041	1887	1689
Manganese TVS Acute	3009	3526	3504	3536	3366	3693	3415	3057
Mercury Numeric Std Chronic (Total)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nickel TVS Chronic	53	79	78	80	70	89	73	55
Nickel TVS Acute	478	714	703	720	635	804	659	497
Selenium Numeric Std Chronic	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Selenium Numeric Std Acute	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4
Silver TVS Chronic (trout)	0.08	0.18	0.17	0.18	0.14	0.23	0.15	0.08
Silver TVS Chronic	NA	NA	NA	NA	NA	NA	NA	NA
Silver TVS Acute	2.1	4.8	4.6	4.9	3.8	6.1	4.1	2.3
Zinc TVS Chronic	120	180	178	182	160	203	166	125
Zinc TVS Acute	120	179	176	180	159	201	165	124

U = not detected. J = estimate because quality control criteria (QCC) were not met.
B = estimate because analyte is present at concentration below the contract required detection limit (CRDL).
Shaded where analyte concentration exhibits significance above background.

UJ = not detected and detection limit (DL) is estimated because QCC were not met.
BJ = estimate because analyte is present below CRDL and QCC were not met.
TVS= Table Value Standards are hardness based for dissolved metals concentrations

NA = No standard promulgated for this analyte in this segment.

= Concentration detected exceeds the standard or the detection limit was higher than the standard.

Dolores River

Silver Creek

TABLE 8
Surface Water Unfiltered Inorganic (ICP-AES) Analytical Results (concentrations in micrograms per liter (µg/L)
(continued)

EPA Sample ID:	MH1G13	MH1G15	MH1G17	MH1G19	MH1G21	MH1G23	MH1G25	MH1G27	MH1G29	MH1G31
Sample Date:	9/21/2005	9/21/2005	9/22/2005	9/22/2005	9/22/2005	9/22/2005	9/22/2005	9/22/2005	9/21/2005	9/21/2005
Station Location:	DR12ASWU09	DR011SWU09	DR008SWU09	DRSC1SWU09	DRSC4SWU09	DR007SWU09	DR004SWU09	DR001SWU09	DR931SWU09	DR932SWU09
Aluminum	200 U	200 U	340	200 U	200 U	4650	937	15100	200 U	200 U
Antimony	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U
Arsenic	10 U	10 U	10 U	[5.5]	[5.1]	[5.3]	10 U	[8.0]	10 U	10 U
Barium	200 U	200 U	200 U	200 U	200 U	200 U	[83.6] J-	216 J-	200 U	200 U
Beryllium	5 U	5 U	5 U	5 U	5 U	5 U	5 U	[0.89] J-	5 U	5 U
Cadmium	5 U	5 U	5 U	5 U	5 U	5 U	5 U	[1.6]	5 U	5 U
Calcium	70500	71000	65700	82500	33200	62600	38900	74800	50500	31400
Chromium	10 U	10 U	10 U	10 U	10 U	[1.8]	[3.3]	15	10 U	10 U
Cobalt	50 U	50 U	50 U	50 U	50 U	50 U	50 U	[7.6] J-	50 U	50 U
Copper	25 U	25 U	[2.1]	[2.5]	25 U	[22.7]	25 U	[21.8] J-	25 U	25 U
Iron	[48.9]	100 U	376	173	100 U	6360	642	18200	100 U	100 U
Lead	10 U	10 U	[7.6]	[4.7]	10 U	63	R	R	10 U	10 U
Magnesium	8730	8830	8170	8870	5000 U	9080	5960	11800	7730	5680
Manganese	28	146	272	103	[3.4]	520	27	259	15 U	15 U
Nickel	40 U	40 U	40 U	40 U	40 U	40 U	[3.9]	[31.4]	40 U	40 U
Potassium	5000 U	[1300]	[1410]	[1080]	[753]	[3070]	[989]	5790	5000 U	5000 U
Selenium	35 U	35 U	35 U	35 U	35 U	35 U	35 U	35 U	35 U	35 U
Silver	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Sodium	[4220]	[3980]	[3720]	[1960]	[1690]	[4020]	[2140]	[2910]	10900	[1890]
Thallium	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Vanadium	50 U	50 U	50 U	50 U	50 U	[8.6]	[2.3]	55	50 U	50 U
Zinc	60 U	81	146	617	60 U	199	[2.9]	116	60 U	60 U

219
252

[ ] = The associated numerical value was detected below the CRQL, but greater than the method detection limit and is therefore an estimate (qualified by laboratory).
U = The analyte was not detected at or above the IDL.
R = Reported value is rejected. The data are unuseable.
J- = The associated numerical value is an estimated quantity but the result may be biased low.
▭ = Concentration exceeds the water quality standard.

Segments within Reservation boundaries are noted in the segment description and last column of Tables 34.6(4).

34.6 TABLES

(1) Introduction

The numeric standards for various parameters in the attached tables were assigned by the Commission after a careful analysis of the data presented on actual stream conditions and on actual and potential water uses.

Numeric standards are not assigned for all parameters listed in the tables attached to Regulation No. 31. If additional numeric standards are found to be needed during future periodic reviews, they can be assigned by following the proper hearing procedures.

(2) Abbreviations:

The following abbreviations are used in the attached tables:

ac	=	acute (1-day)
Ag	=	silver
Al	=	aluminum
As	=	arsenic
B	=	boron
Ba	=	barium
Be	=	beryllium
Cd	=	cadmium
ch	=	chronic (30-day)
Cl	=	chloride
Cl2	=	residual chlorine
CN	=	free cyanide
CrIII	=	trivalent chromium
CrVI	=	hexavalent chromium
Cu	=	copper
dis	=	dissolved
D.O.	=	dissolved oxygen
E.coli	=	escherichia coli
F	=	fluoride
Fe	=	iron
Hg	=	mercury
mg/l	=	milligrams per liter
ml	=	milliliters
Mn	=	manganese
NH3	=	un-ionized ammonia as N(nitrogen)
Ni	=	nickel
NO2	=	nitrite as N (nitrogen)
NO3	=	nitrate as N (nitrogen)
OW	=	outstanding waters
P	=	phosphorus
Pb	=	lead
S	=	sulfide as undissociated H2S (hydrogen sulfide)
Sb	=	antimony
Se	=	selenium
SO4	=	sulfate
sp	=	spawning

Tl	=	thallium
tr	=	trout
Trec	=	total recoverable
TVS	=	table value standard
U	=	uranium
µg/l	=	micrograms per liter
UP	=	use-protected
Zn	=	zinc

In addition, the following abbreviations are used:

Fe(ch)	=	WS(dis)
Mn(ch)	=	WS(dis)
SO4	=	WS

These abbreviations mean: For all surface waters with an actual water supply use, the less restrictive of the following two options shall apply as numerical standards, as specified in the Basic Standards and Methodologies at 31.16 Table II and III:

(i) existing quality as of January 1, 2000; or

(ii) Iron = 300 µg/l (dissolved)
Manganese = 50µg/l (dissolved)
SO4 = 250 mg/l

For all surface waters with a "water supply" classification that are not in actual use as a water supply, no water supply standards are applied for iron, manganese or sulfate, unless the Commission determines as the result of a site-specific rulemaking hearing that such standards are appropriate.

(3) Table Value Standards

In certain instances in the attached tables, the designation "TVS" is used to indicate that for a particular parameter a "table value standard" has been adopted. This designation refers to numerical criteria set forth in the Basic Standards and Methodologies for Surface Water. The criteria for which the TVS are applicable are on the following table.

TABLE VALUE STANDARDS

(Concentrations in ug/l unless noted)

PARAMETER[1]	TABLE VALUE STANDARDS[2][3]
Ammonia[4]	Cold Water $acute = \frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}$ $chronic = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) * MIN\left(2.85,\ 1.45 * 10^{0.028(25-T)}\right)$ Warm Water

$$acute = \frac{0.411}{1 + 10^{7.204 - pH}} + \frac{58.4}{1 + 10^{pH - 7.204}}$$

$$chronic\ (Apr1 - Aug31) = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right) * MIN\left(2.85,\ 1.45 * 10^{0.028(25-T)}\right)$$

$$chronic\ (Sep1 - Mar31) = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right) * 1.45 * 10^{0.028*(25-MAX(T,\ 7))}$$

NH_3 = old TVS	Cold Water Acute = 0.43/FT/FPH/2$^{(4\ old)}$ in mg/l (N) Warm Water Acute = 0.62/FT/FPH/2$^{(4\ old)}$ in mg/ (N)
Cadmium	Acute = (1.136672-[ln(hardness)x(0.041838)])xe$^{0.9151[ln(hardness)]-3.1485}$ Acute(Trout) = (1.136672-[ln(hardness)x(0.041838)])xe$^{0.9151[ln(hardness)]-3.6236}$ Chronic = (1.101672-[ln(hardness)x(0.041838)]e$^{0.7998[ln(hardness)]-4.4451}$
Chromium III[5]	Acute = e$^{(0.819[ln(hardness)]+2.5736)}$ Chronic= e$^{(0.819[ln(hardness)]+0.5340)}$
Chromium VI[5]	Acute = 16 Chronic = 11
Copper	Acute = e$^{(0.9422[ln(hardness)]-1.7408)}$ Chronic = e$^{(0.8545[ln(hardness)]-1.7428)}$
Lead	Acute = (1.46203-[ln(hardness)*(0.145712)])*e$^{(1.273[ln(hardness)]-1.46)}$ Chronic = (1.46203-[ln(hardness)*(0.145712)])*e$^{(1.273[ln(hardness)]-4.705)}$
Manganese	Acute = e$^{(0.3331[ln(hardness)]+6.4676)}$ Chronic = e$^{(0.3331\ [ln(hardness)]+5.8743)}$
Nickel	Acute = e$^{(0.846[ln(hardness)]+2.253)}$ Chronic = e$^{(0.846[ln(hardness)]+0.0554)}$

Selenium[6]	Acute = 18.4 Chronic = 4.6
Silver	Acute = $\frac{1}{2}e^{(1.72[\ln(hardness)]-6.52)}$ Chronic = $e^{(1.72[\ln(hardness)]-9.06)}$ Chronic(Trout) = $e^{(1.72[\ln(hardness)]-10.51)}$
Uranium	Acute = $e^{(1.1021[\ln(hardness)]+2.7088)}$ Chronic = $e^{(1.1021[\ln(hardness)]+2.2382)}$
Zinc	Acute = $0.978\ e^{(0.8525[\ln(hardness)]+1.0617)}$ Chronic = $0.986\ e^{(0.8525[\ln(hardness)]+0.9109)}$ if hardness less than 113 mg/l $CaCO_3$ Chronic (sculpin) = $e^{(2.227[\ln(hardness)]-5.604)}$

TABLE VALUE STANDARDS - FOOTNOTES

(1) Metals are stated as dissolved unless otherwise specified.

(2) Hardness values to be used in equations are in mg/l as calcium carbonate and shall be no greater than 400 mg/L. The hardness values used in calculating the appropriate metal standard should be based on the lower 95 per cent confidence limit of the mean hardness value at the periodic low flow criteria as determined from a regression analysis of site-specific data. Where insufficient site-specific data exists to define the mean hardness value at the periodic low flow criteria, representative regional data shall be used to perform the regression analysis. Where a regression analysis is not appropriate, a site-specific method should be used. In calculating a hardness value, regression analyses should not be extrapolated past the point that data exist.

(3) Both acute and chronic numbers adopted as stream standards are levels not to be exceeded more than once every three years on the average.

(4 old) $FT = 10^{0.03(20-TCAP)}$;

Where TCAP is ≤ T ≤ 30

$FT = 10^{0.03(20-T)}$;

Where 0 is ≤ T ≤ TCAP

TCAP = 20o C cold water aquatic life species present

TCAP = 25o C cold water aquatic life species absent

FPH = 1; Where 8 <pH ≤9

$$FPH = \frac{1 + 10^{(7.4-pH)}}{1.25}; \qquad \text{Where } 6.5 \le pH \le 8$$

FPH means the acute pH adjustment factor, defined by the above formulas.

FT means the acute temperature adjustment factor, defined by the above formulas.

T means temperature measured in degrees celsius.

TCAP means temperature CAP; the maximum temperature which affects the toxicity of ammonia to salmonid and non-salmonid fish groups.

NOTE: If the calculated acute value is less than the calculated chronic value, then the calculated chronic value shall be used as the acute standard.

(4) For acute conditions the default assumption is that salmonids could be present in cold water segments and should be protected, and that salmonids do not need to be protected in warm water segments. For chronic conditions, the default assumptions are that early life stages could be present all year in cold water segments and should be protected. In warm water segments the default assumption is that early life stages are present and should be protected only from April 1 through August 31. These assumptions can be modified by the commission on a site-specific basis where appropriate evidence is submitted.

(5) Unless the stability of the chromium valence state in receiving waters can be clearly demonstrated, the standard for chromium should be in terms of chromium VI. In no case can the sum of the instream levels of Hexavalent and Trivalent Chromium exceed the water supply standard of 50 ug/l total chromium in those waters classified for domestic water use.

(6) Selenium is a bioaccumulative metal and subject to a range of toxicity values depending upon numerous site-specific variables.

[INSERT TABLES]

http://www.cdphe.state.co.us/regulations/wqccregs/100234sanjuanbasin new.pdf

STREAM CLASSIFICATIONS and WATER QUALITY STANDARDS

REGION: 9 **BASIN: DOLORES RIVER** Stream Segment Description	Desig	Classifications	NUMERIC STANDARDS PHYSICAL and BIOLOGICAL	INORGANIC mg/l		METALS ug/l			TEMPORARY MODIFICATIONS AND QUALIFIERS
9. Mainstem of Silver Creek from a point immediately below the Town of Rico's water supply diversion to the confluence with the Dolores River.		Aq Life Cold 2 Agriculture Nov. 1 to April 30 Recreation N May 1 to Oct. 31 Recreation E	D.O. = 6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 Nov. 1 to April 30 E.Coli=630/100ml May 1 to Oct. 31 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05	As(ac)=340 As(ch)=7.6(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ch)=100(Trec) CrVI(ac/ch)=TVS	Cu(ac/ch)=TVS Pb(ac/ch)=TVS Mn(ac/ch)=TVS Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Fish Ingestion
10. Mainstem of the West Dolores River from the Lizard Head Wilderness Area boundary to the confluence with the Dolores River.		Aq Life Cold 1 Recreation E Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=340 As(ch)=0.02(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=50(dis) Mn(ac/ch)=TVS Mn(ch)=WS(dis) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
11. All tributaries to the Dolores River, including all wetlands, lakes and reservoirs, from a point immediately below the confluence of the West Dolores River, to the bridge at Bradfield Ranch (Forest Route 505, near Montezuma/Dolores County Line), except for the specific listing in Segments 4 and 5.		Aq Life Cold 2 Recreation E Water Supply Agricultur	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=340 As(ch)=0.02(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS	Cu(ac/ch)=TVS Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=WS(dis) Mn(ac/ch)=TVS Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac/ch)=TVS Zn(ac)=TVS Zn(ch)= TVS(sc)	Water + Fish Standards

DRSC4 – UPPER SILVER CREEK

DRSC1 – SILVER CREEK @ CONFLUENCE

DR007 – ~~HEADWATERS~~ DOLORES RIVER @ 145 – SOUTH OF ST. LOUIS DISCHARGE POINT.

DR004 – ABOVE ST LOUIS TUNNEL ON DOLORES

DR008 – BELOW CONFLUENCE OF SC ON DOLORES

DR011 – USGS RICO GAUGING STN

STREAM CLASSIFICATIONS and WATER QUALITY STANDARDS

REGION: 9 **BASIN: DOLORES RIVER** Stream Segment Description		Desig	Classifications	NUMERIC STANDARDS						TEMPORARY MODIFICATIONS AND QUALIFIERS
				PHYSICAL and BIOLOGICAL	INORGANIC mg/l		METALS ug/l			
1.	ll tributaries to the Dolores River and West Dolores River, including all wetlands, tributaries, lakes, and reservoirs, which are within the Lizard Head Wilderness area.	OW	Aq Life Cold 1 Recreation E Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=340 As(ch)=0.02(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis) Hg(ch)=0.01(tot) Ni(ac/ch)=TVS	Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac)=TVS Zn(ch)= TVS(sc)	
2.	Mainstem of the Dolores River from the source to a point immediately above the confluence with Horse Creek.		Aq Life Cold 1 Recreation E Water Supply Agriculture	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=340 As(ch)=0.02(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ch)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=(TVS) Mn(ac/ch)=TVS Mn(ch)=WS(dis) Hg(ch)=0.01(tot) Ni(ac/ch)=TVS	Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac)=TVS Zn(ch)= TVS(sc)	
3.	Mainstem of the Dolores River from a point immediately above the confluence with Horse Creek to a point immediately above the confluence with Bear Creek.		Aq Life Cold 1 Recreation E Agriculture	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05	As(ac)=340 As(ch)=7.6(Trec) Cd(ac)=TVS Cd(ch)=TVS CrIII(ch)=100(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Hg(ch)=0.01(tot) Ni(ac/ch)=TVS	Se(ac/ch)=TVS Ag(ac/ch)=TVS Zn(ac/ch)=TVS	
4a.	Mainstem of the Dolores River from a point immediately above the confluence with Bear Creek to the bridge at Bradfield Ranch (Forest Route 505, near Montezuma/Dolores County Line).		Aq Life Cold 1 Recreation E Water Supply Agriculture	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=340 As(ch)=0.02(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
4b.	McPhee Reservoir and Summit Reservoir.		Aq Life Cold 1 Recreation E Water Supply Agriculture	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=340 As(ch)=0.02(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
5.	All tributaries to the Dolores River and West Dolores River, including all wetlands, lakes and reservoirs, from the source to a point immediately below the confluence with the West Dolores River except for specific listings in Segments 1 and 6 through 10; mainstem of Beaver Creek (including Plateau Creek) from the source to the confluence with the Dolores River. Groundhog Reservoir.		Aq Life Cold 1 Recreation E Water Supply Agriculture	D.O. = 6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=340 As(ch)=0.02(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac)=TVS Zn(ch)= TVS(sc)	Chronic zinc sculpin standard applies to Silver Creek and Fish Creek.
6.	Mainstem of the Slate Creek and Coke Oven Creek, from the Lizard Head Wilderness Area boundary to their confluences with the Dolores River.		Aq Life Cold 1 Recreation E Water Supply Agriculture	D.O. = 6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=340 As(ch)=0.02(Trec) Cd(ac/ch)=TVS CrIII(ch)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
7.	Mainstem of Coal Creek from the boundary of the Lizard Head Wilderness Area to the confluence with the Dolores River.		Aq Life Cold 1 Recreation E Water Supply Agriculture	D.O. = 6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=340 As(ch)=0.02(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis) Hg(ch)=0.01(tot) Ni(ac/ch)=TVS	Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac)=TVS Zn(ch)= TVS(sc)	
8.	Mainstem of Horse Creek from the source to the confluence with the Dolores River.		Aq Life Cold 1 Recreation E Water Supply Agriculture	D.O. = 6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 E.Coli=126/100ml	NH_3(ac/ch)=TVS Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=340 As(ch)=0.02(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis) Hg(ch)=0.01(tot) Ni(ac/ch)=TVS	Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	

00060, Discharge, cubic feet per second,

YEAR	Monthly mean in cfs (Calculation Period: 1984-01-01 -> 2009-09-30) Period-of-record for statistical calculation restricted by user											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1984	31.2	33.7	51.2	133.1	846.0	706.7	177.7	148.5	72.5	81.1	56.1	39.7
1985	31.1	24.9	32.0	191.9	523.6	799.0	170.2	72.0	113.9	95.2	49.2	36.8
1986	32.5	32.5	59.4	153.5	619.6	766.6	240.6	76.6	84.1	87.6	65.9	39.5
1987	27.3	25.6	35.5	171.8	521.6	747.4	211.1	111.6	55.0	37.5	49.5	24.5
1988	18.7	19.0	36.5	118.7	348.0	352.7	91.6	71.5	85.5	42.3	25.2	19.8
1989	19.9	22.1	70.5	227.9	374.0	191.9	60.5	51.6	28.4	23.9	12.2	7.81
1990	7.74	8.54	17.0	53.5	286.7	340.0	92.3	57.8	52.8	72.4	35.4	12.3
1991	10.7	12.8	21.1	117.1	416.9	358.2	94.9	62.4	91.0	28.6	23.6	23.6
1992	17.0	14.2	25.8	172.3	504.2	372.3	118.1	60.8	37.6	24.7	21.3	15.7
1993	14.7	13.9	29.8	122.1	673.5	888.3	219.5	72.6	49.6	30.9	15.1	11.2
1994	8.00	7.49	27.4	91.4	427.4	417.4	59.5	33.5	43.0	45.0	28.9	19.3
1995	15.0	24.6	52.5	87.1	248.9	1,013	548.8	119.4	65.9	32.5	20.2	18.0
1996	15.1	17.3	27.9	127.8	522.5	141.0	59.2	29.7	38.9			
1998										40.8	41.4	23.7
1999	15.3	15.8	54.3	128.6	407.8	595.3	228.3	266.9	162.7	37.8	16.3	15.7
2000	14.8	16.4	27.3	191.4	492.1	165.1	45.1	41.4	37.4	33.3	27.8	21.0
2001	21.0	22.0	36.6	156.2	611.1	315.4	80.5	92.7	29.0	25.0	20.2	27.9
2002	21.8	18.1	20.0	110.1	108.2	36.3	16.7	14.2	34.8	30.3	18.0	10.8
2003	10.3	9.78	33.8	114.7	476.8	263.8	38.7	51.2	99.8	32.3	20.9	7.96
2004	8.65	16.6	159.3	417.8	600.5	330.6	64.3	29.5	57.2	52.3	37.9	20.4
2005	28.3	29.9	43.5	198.7	713.3	595.5	152.8	54.9	28.4	52.2	19.7	16.8
2006	18.5	18.3	32.4	181.7	440.2	143.5	69.2	90.1	91.3	225.2	59.8	37.0
2007	27.8	18.5	78.6	141.3	486.2	338.0	101.0	125.9	82.1	59.1	28.8	18.8
2008	18.2	19.0	41.1	165.6	524.2	720.1	145.9	59.7	45.4	31.3	21.8	20.5
2009	16.7	18.2	38.5	199.4	786.0	281.1	87.4	30.4	25.8			
Mean of monthly Discharge	19	19	44	157	498	453	132	76	63	53	31	21

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USGS 09165000 DOLORES RIVER BELOW RICO, CO.

Available data for this site Time-series: Monthly statistics GO

Dolores County, Colorado
Hydrologic Unit Code 14030002
Latitude 37°38'20", Longitude 108°03'35" NAD27
Drainage area 105 square miles
Gage datum 8,422.23 feet above sea level NGVD29

Output formats
HTML table of all data
Tab-separated data
Reselect output format

00060, Discharge, cubic feet per second,												
YEAR	Monthly mean in cfs (Calculation Period: 1984-01-01 -> 2009-09-30) Period-of-record for statistical calculation restricted by user											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1984	31.2	33.7	51.2	133.1	846.0	706.7	177.7	148.5	72.5	81.1	56.1	39.7
1985	31.1	24.9	32.0	191.9	523.6	799.0	170.2	72.0	113.9	95.2	49.2	36.8
1986	32.5	32.5	59.4	153.5	619.6	766.6	240.6	76.6	84.1	87.6	65.9	39.5
1987	27.3	25.6	35.5	171.8	521.6	747.4	211.1	111.6	55.0	37.5	49.5	24.5
1988	18.7	19.0	36.5	118.7	348.0	352.7	91.6	71.5	85.5	42.3	25.2	19.8
1989	19.9	22.1	70.5	227.9	374.0	191.9	60.5	51.6	28.4	23.9	12.2	7.81
1990	7.74	8.54	17.0	53.5	286.7	340.0	92.3	57.8	52.8	72.4	35.4	12.3
1991	10.7	12.8	21.1	117.1	416.9	358.2	94.9	62.4	91.0	28.6	23.6	23.6
1992	17.0	14.2	25.8	172.3	504.2	372.3	118.1	60.8	37.6	24.7	21.3	15.7
1993	14.7	13.9	29.8	122.1	673.5	888.3	219.5	72.6	49.6	30.9	15.1	11.2
1994	8.00	7.49	27.4	91.4	427.4	417.4	59.5	33.5	43.0	45.0	28.9	19.3
1995	15.0	24.6	52.5	87.1	248.9	1,013	548.8	119.4	65.9	32.5	20.2	18.0
1996	15.1	17.3	27.9	127.8	522.5	141.0	59.2	29.7	38.9			
1998										40.8	41.4	23.7

1999	15.3	15.8	54.3	128.6	407.8	595.3	228.3	266.9	162.7	37.8	16.3	15.7
2000	14.8	16.4	27.3	191.4	492.1	165.1	45.1	41.4	37.4	33.3	27.8	21.0
2001	21.0	22.0	36.6	156.2	611.1	315.4	80.5	92.7	29.0	25.0	20.2	27.9
2002	21.8	18.1	20.0	110.1	108.2	36.3	16.7	14.2	34.8	30.3	18.0	10.8
2003	10.3	9.78	33.8	114.7	476.8	263.8	38.7	51.2	99.8	32.3	20.9	7.96
2004	8.65	16.6	159.3	417.8	600.5	330.6	64.3	29.5	57.2	52.3	37.9	20.4
2005	28.3	29.9	43.5	198.7	713.3	595.5	152.8	54.9	28.4	52.2	19.7	16.8
2006	18.5	18.3	32.4	181.7	440.2	143.5	69.2	90.1	91.3	225.2	59.8	37.0
2007	27.8	18.5	78.6	141.3	486.2	338.0	101.0	125.9	82.1	59.1	28.8	18.8
2008	18.2	19.0	41.1	165.6	524.2	720.1	145.9	59.7	45.4	31.3	21.8	20.5
2009	16.7	18.2	38.5	199.4	786.0	281.1	87.4	30.4	25.8			
Mean of monthly Discharge	19	19	44	157	498	453	132	76	63	53	31	21

** No Incomplete data have been used for statistical calculation

Table A-28
Baseline Water Quality Concentrations for the St. Louis Ponds (Oct-Dec)

Pollutant	M_{eff}	Q_{eff} (cfs)	$M_{u/s}$	$Q_{u/s}$ (cfs)	BWQ	WQS
As, Trec (ug/l)	0	2.2	0.50	3.9	0.32	100
Cd, Dis (ug/l)	7.3	2.2	0.38	3.9	2.9	3.3
Cr^{+3}, Trec (ug/l)	0	2.2	0.95	3.9	0.61	100
Cr^{+6}, Dis (ug/l)	0	2.2	0	3.9	0	11
Cu, Dis (ug/l)	0	2.2	0.60	3.9	0.38	14
CN, Free (ug/l)	0	2.2	0	2.9	0	5.0
Fe, Trec (ug/l)	722	2.2	740	3.9	734	1000
Pb, Dis (ug/l)	0.45	2.2	0.79	3.9	0.67	4.5
Mn, Dis (ug/l)	1835	2.2	364	3.9	895	1972
Hg, Tot (ug/l)	0	2.2	0	3.9	0	0.010
Ni, Dis (ug/l)	0	2.2	0.66	3.9	0.42	82
Se, Dis (ug/l)	0	2.2	0.50	3.9	0.32	4.6
Ag, Dis (ug/l)	0.16	2.2	0.34	3.9	0.28	0.81
Zn, Dis (ug/l)	2200	2.2	9.9	3.9	***800***	***186***

Table A-29
Baseline Water Quality Concentrations for the Silver Swan Adit

Pollutant	M_{eff}	Q_{eff} (cfs)	$M_{u/s}$	$Q_{u/s}$ (cfs)	BWQ	WQS
As, Trec (ug/l)	16	0.10	0	0	16	100
Cd, Dis (ug/l)	1.0	0.10	0	0	1.0	6.2
Cr^{+3}, Trec (ug/l)	0	0.10	0	0	0	100
Cr^{+6}, Dis (ug/l)	0	0.10	0	0	0	11
Cu, Dis (ug/l)	0	0.10	0	0	0	29
CN, Free (ug/l)	0	0.10	0	0	0	5.0
Fe, Trec (ug/l)	6047	0.10	0	0	***6047***	***1000***
Pb, Dis (ug/l)	5.4	0.10	0	0	5.4	11
Mn, Dis (ug/l)	1252	0.10	0	0	1252	2618
Hg, Tot (ug/l)	0.11	0.10	0	0	***0.11***	***0.010***
Ni, Dis (ug/l)	0	0.10	0	0	0	168
Se, Dis (ug/l)	0	0.10	0	0	0	4.6
Ag, Dis (ug/l)	0.0071	0.10	0	0	0.0071	3.5
Zn, Dis (ug/l)	665	0.10	0	0	***665***	***382***

Table A-26 Baseline Water Quality Concentrations for the St. Louis Ponds (Jan-Mar)						
Pollutant	M_{eff}	Q_{eff} (cfs)	$M_{u/s}$	$Q_{u/s}$ (cfs)	***BWQ***	***WQS***
As, Trec (ug/l)	0	2.0	0.50	4.0	0.33	100
Cd, Dis (ug/l)	7.3	2.0	0.38	4.0	2.7	3.3
Cr^{+3}, Trec (ug/l)	0	2.0	1.0	4.0	0.63	100
Cr^{+6}, Dis (ug/l)	0	2.0	0	4.0	0	11
Cu, Dis (ug/l)	0	2.0	0.60	4.0	0.40	14
CN, Free (ug/l)	0	2.0	0	3.1	0	5.0
Fe, Trec (ug/l)	722	2.0	740	4.0	734	1000
Pb, Dis (ug/l)	0.45	2.0	0.79	4.0	0.68	4.5
Mn, Dis (ug/l)	1835	2.0	364	4.0	854	1972
Hg, Tot (ug/l)	0	2.0	0	4.0	0	0.010
Ni, Dis (ug/l)	0	2.0	0.66	4.0	0.44	82
Se, Dis (ug/l)	0	2.0	0.50	4.0	0.33	4.6
Ag, Dis (ug/l)	0.16	2.0	0.34	4.0	0.28	0.81
Zn, Dis (ug/l)	2200	2.0	9.9	4.0	*740*	*186*

Table A-27 Baseline Water Quality Concentrations for the St. Louis Ponds (Apr-Sep)						
Pollutant	M_{eff}	Q_{eff} (cfs)	$M_{u/s}$	$Q_{u/s}$ (cfs)	***BWQ***	***WQS***
As, Trec (ug/l)	0	3.1	0.50	10	0.38	100
Cd, Dis (ug/l)	7.3	3.1	0.38	10	2.0	3.3
Cr^{+3}, Trec (ug/l)	0	3.1	0.95	10	0.73	100
Cr^{+6}, Dis (ug/l)	0	3.1	0	10	0	11
Cu, Dis (ug/l)	0	3.1	0.60	10	0.46	14
CN, Free (ug/l)	0	3.1	0	10	0	5.0
Fe, Trec (ug/l)	722	3.1	740	10	736	1000
Pb, Dis (ug/l)	0.45	3.1	0.79	10	0.71	4.5
Mn, Dis (ug/l)	1835	3.1	364	10	712	1972
Hg, Tot (ug/l)	0	3.1	0	10	0	0.010
Ni, Dis (ug/l)	0	3.1	0.66	10	0.50	82
Se, Dis (ug/l)	0	3.1	0.50	10	0.38	4.6
Ag, Dis (ug/l)	0.16	3.1	0.34	10	0.30	0.81
Zn, Dis (ug/l)	2200	3.1	9.9	10	*528*	*186*

Rico Argentine Data

Analyte	Sample ID: (Abbrev	SLSW01 (Total) (µg/l) Upgradient of adit flume	SLSW01 (Diss.) (µg/l) Upgradient of adit flume	SLSW02 (Total) (µg/l) Dngradient of outfall flume	SLSW02 (Diss.) (µg/l) Dngradient of outfall flume	SLSD03 (mg/kg) 5 aliquots from upper pond	SLSD04 (mg/kg) 1 aliquot from next pond down
Aluminium	(Al)	1,300	350	26	ND	26,000	39,000
Antimony	(An)	ND	ND	ND	ND	ND	ND
Arsenic	(As)	4.7	ND	ND	ND	41	57
Barium	(Ba)	23	22	23	25	66	90
Beryllium	(Be)	1.2	0.81	ND	ND	18	25
Cadmium	(Cd)	54	52	31	31	92	130
Calcium	(Ca)	220,000	230,000	250,000	250,000	23,000	27,000
Ca Hardness as CaCO3		-	580	-	630	-	-
Chromium	(Cr)	1.2	ND	0.73	ND	18	27
Cobalt	(Co)	5.9	4.2	2.8	3.6	18	24
Copper	(Cu)	420	91	10	3.5	4,900	7,800
Hardness CaCO3		-	670	-	740	-	-
Iron	(Fe)	9,400	2,500	380	27	220,000	310,000
Lead	(Pb)	13	ND	ND	ND	550	760
Magnesium	(Mg)	21,000	22,000	26,000	25,000	2,500	2,600
Mg hardness as CaCO3		-	90	-	100	-	-
Manganese	(Mn)	3,900	3,100	2,400	2,400	9,500	12,000
Mercury	(Hg)	ND	ND	ND	ND	ND	ND
Nickel	(Ni)	7.7	7.3	5.9	6.4	16	24
Potassium	(K)	1,900	1,800	2,800	2,900	500	830
Selenium	(Se)	ND	ND	ND	ND	ND	ND
Silver	(Ag)	1.8	1.8	1.8	1.6	3.6	2.7
Sodium	(Na)	11,000	12,000	15,000	15,000	430	ND
Thallium	(Tl)	ND	ND	ND	ND	ND	ND
Vanadium	(V)	ND	ND	ND	ND	11	14
Zinc	(Zn)	8,300	7,700	4,100	3,900	18,000	27,000

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the CRDL.
E The associated numerical value is an estimated quantity because because of the presence of interference. An explanatory note may be included in the narrative.
- Not analyzed for: no value available.
ND Not detected.

bulkhead @ Tunnel